DEVELOPMENT OF AN ULTRA-SAFE RECHARGEABLE LITHIUM-ION BATTERY

Contract # N00014-94-C-0141
ARPA Order # 9332004arp01/13 APR 1994/313ES

R & D Status Report # 10

Reporting Period: 16 July to 15 August, 1995

Submitted by:

The Electrofuel Manufacturing Company Inc.

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R&D STATUS REPORT
1931-1010/0

ARPA Order No.: 9332004arp01/13APR1994/313ES
Program Code No.: ARPA-BAA93-32
Contractor: The Electrofuel Manufacturing Company Inc.
Contract No.: N00014-94-C-0141 Contract Amount: $1271728.
Effective Date of Contract: August 15, 1994
Expiration Date of Contract: February 14, 1996
Principal Investigator: J.K. Jacobs
Telephone No.: (800) 388-2865
Short Title of Work: Lithium-ion Battery Development
Reporting Period: July 16, 1995 to August 15, 1995

Description of Progress:

During this period, the work continued in a number of directions. These included the setup of the equipment for etching of aluminum foils in a continuous manner and also investigate methods to increase adhesion to the electrode. The small scale experiments to optimize this process had been done in earlier months.

Testing of the complete continuous etching and treatment process for the Al foils were completed. Excellent foils were produced which showed good adherence to the positive electrode material. After the etching process the foil lost 20% of its weight. (Impedance of the foil/electrode interface was measured which shows that the interface has low surface impedance.)

It is felt that an automatic control of the etching process is necessary for optimum results. This would control the chemical balance. Design is in progress for a simple optical control.

The continuous etching process of the Al foil consists of seven stages, some of which need to have precise control. Otherwise the foil gets overetched and falls apart, or does not have enough etching to give adhesion to the electrode coatings.

For the electrode coating, the alternate box coating technique was used repeatedly on unetched Al foil and was found to give good results.

The results from the operation of this equipment is being used to improve design of a pilot plant. Successful test with the thin 0.0005" aluminum foil shows that the system can be used as is, but on the pilot line the idler rolls could be improved.

Further study on the grinding of carbon materials was done. Development of a methodology using 3-roll sheer grinder is continuing. This method appears to be more effective than standard milling techniques which had been tried earlier.

Construction is also underway of larger vacuum processing facility for active materials (pilot size) and electrolyte.

All of the information being generated from the use of this prototype production line will be used to design the pilot line.

Coordination with the makers of battery cases for the 5590 and other sizes have started. Design details of how the cells will fit into the battery case is also being started. These include the packing characteristics of the cells into the battery case.

Fabrication of the handcrafted cells continues, and testing of the cells are being done for verification of the chemistry. Any changes in chemistry will be integrated into the prototype flexible manufacturing line.

Six handcrafted cells using the "glued cell" concept is being cycled. The initial test results shows that the impedance of the cells is not affected, infact they appear to be improved. This is possibly due to improved Lithium ion conductivity. The cells show no delamination and are performing very well.

Change in Key Personnel: None

Summary of Substantive Information Derived from Special Events:
None:

Problems Encountered and/or Anticipated: None

Action Required by the Government: None

Fiscal Status:

	Total Estimate of Program	US Govt Funding Obligation	Electro fuel Contribution
(1)Amt.currently provided on contract:	$1630421	$1271728	$358693
(2)Expenses & commitments to date:	$ 811936	$ 633310	$178626
(3)Funds required to complete work:	$ 818485	$ 638418	$180067

ARPA monthly contribution